US006628058B2

(12) **United States Patent**
Park

(10) **Patent No.: US 6,628,058 B2**
(45) **Date of Patent: Sep. 30, 2003**

(54) **FLAT TENSION MASK TYPE CATHODE RAY TUBE**

(75) Inventor: **Ki Bum Park**, Kyongsan (KR)

(73) Assignee: **LG Electronics Inc.**, Seoul (KR)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/829,973**

(22) Filed: **Apr. 11, 2001**

(65) **Prior Publication Data**

US 2001/0043037 A1 Nov. 22, 2001

(30) **Foreign Application Priority Data**

Apr. 12, 2000 (KR) 2000-19320

(51) **Int. Cl.**[7] **H01J 29/80**
(52) **U.S. Cl.** **313/407**; 313/402; 313/408
(58) **Field of Search** 313/407, 402, 313/408, 7, 8

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,565,946 A * 1/1986 Barrett et al. 313/408
5,532,545 A * 7/1996 Okamoto et al. 313/402
5,818,156 A * 10/1998 Misono 313/412
6,107,729 A * 8/2000 Banno 313/403
6,139,996 A * 10/2000 Choi et al. 106/287.18
6,246,163 B1 * 6/2001 Matsudate et al. 313/402
6,411,025 B1 * 6/2002 Bae 313/403

* cited by examiner

Primary Examiner—Sandra O'Shea
Assistant Examiner—Sumati Krishnan
(74) *Attorney, Agent, or Firm*—Fleshner & Kim, LLP

(57) **ABSTRACT**

The present invention relates to a flat tension mask type CRT which improves structures of a shadow mask and a panel, herein the shadow mask has a thickness of 50 μm~80 μm, the panel has a transmittance of 47%~50%, the flat CRT has a luminance of not less than 31FL, and the panel has a thickness of 13 mm~14.5 mm, accordingly the present invention is capable of heightening productivity and durability, and at the same time improving overall luminance and color vividness by increasing the thickness of the shadow mask.

15 Claims, 5 Drawing Sheets

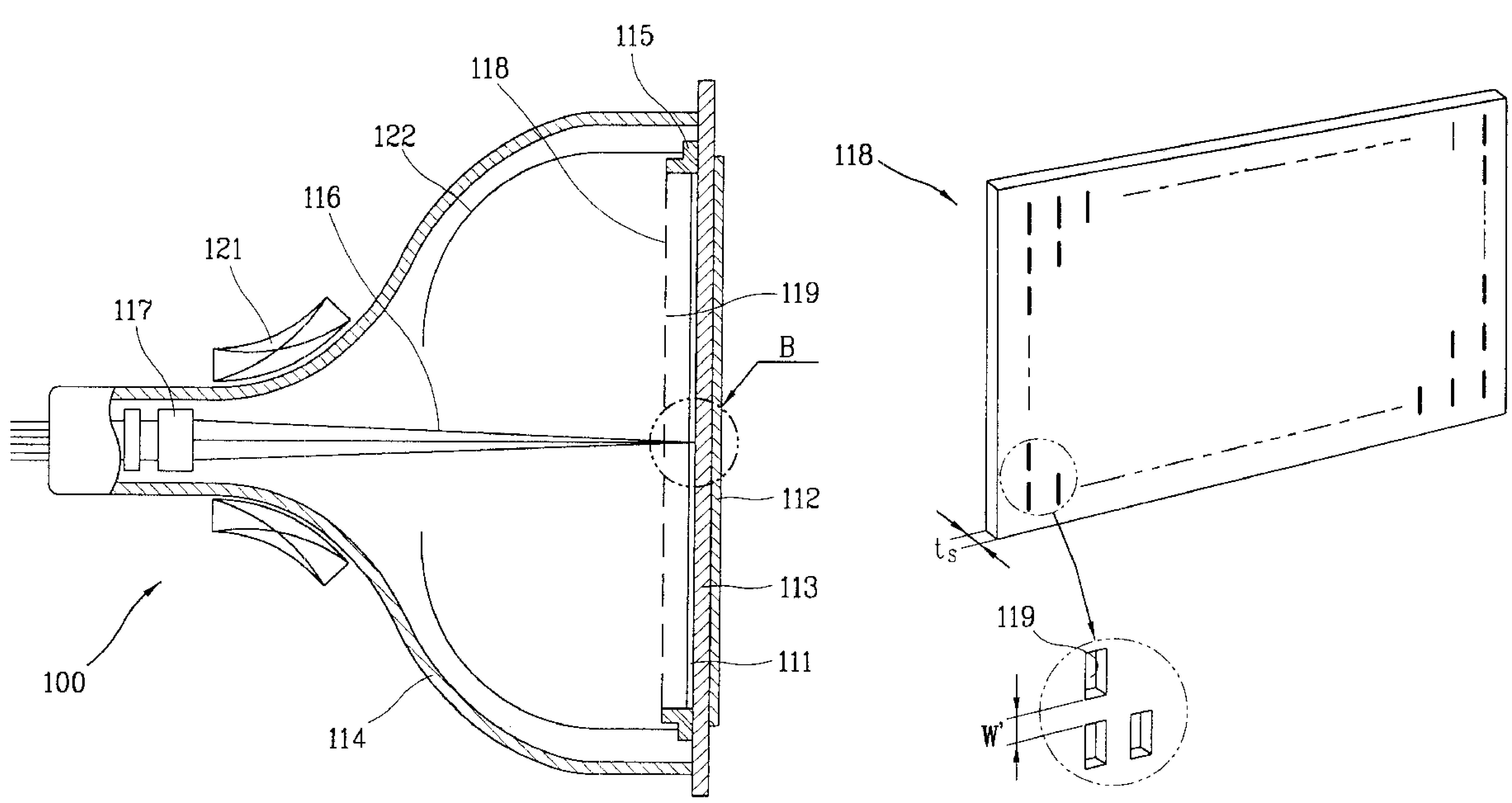


FIG. 1
BACKGROUND ART

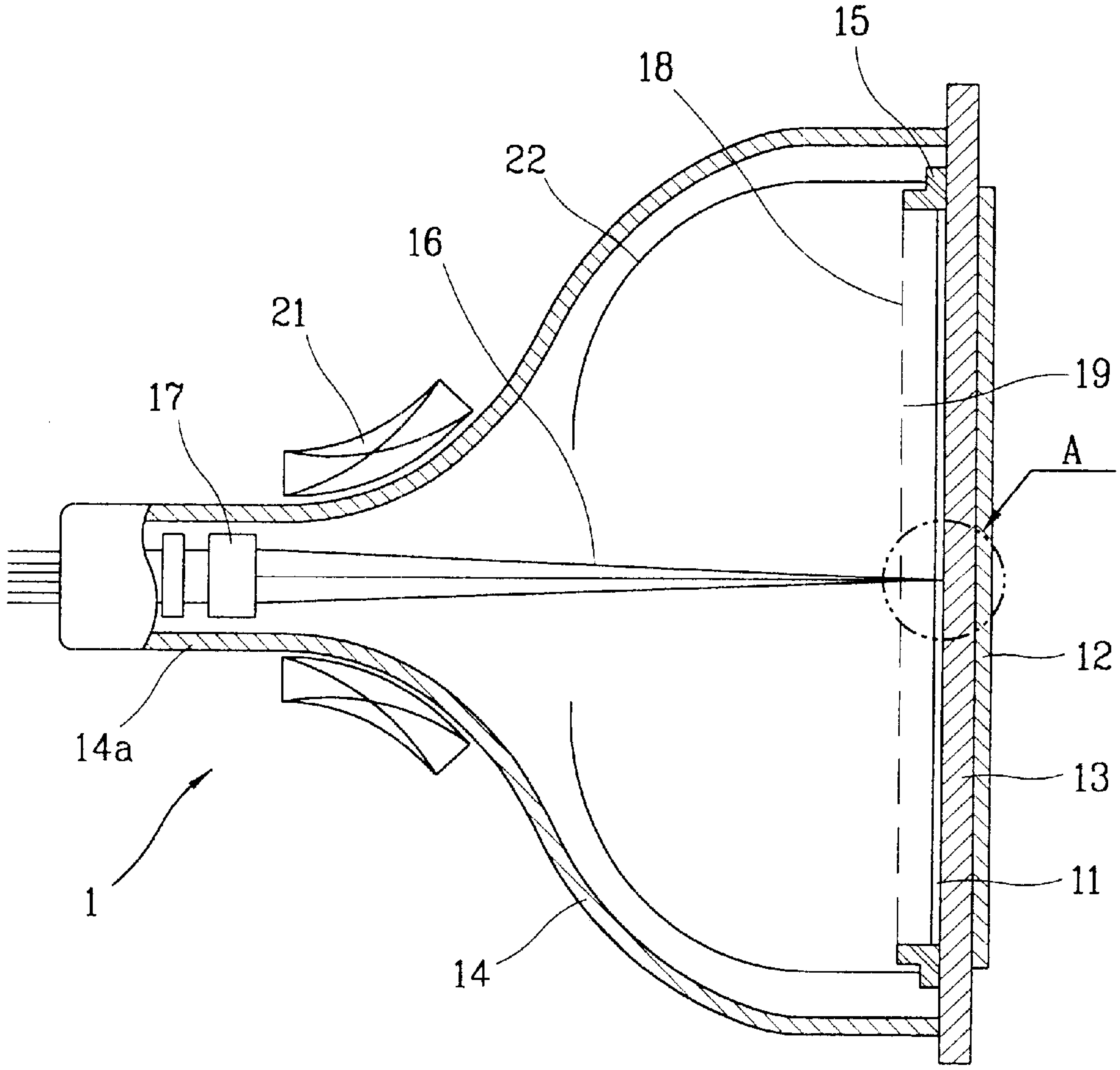


FIG. 2
BACKGROUND ART

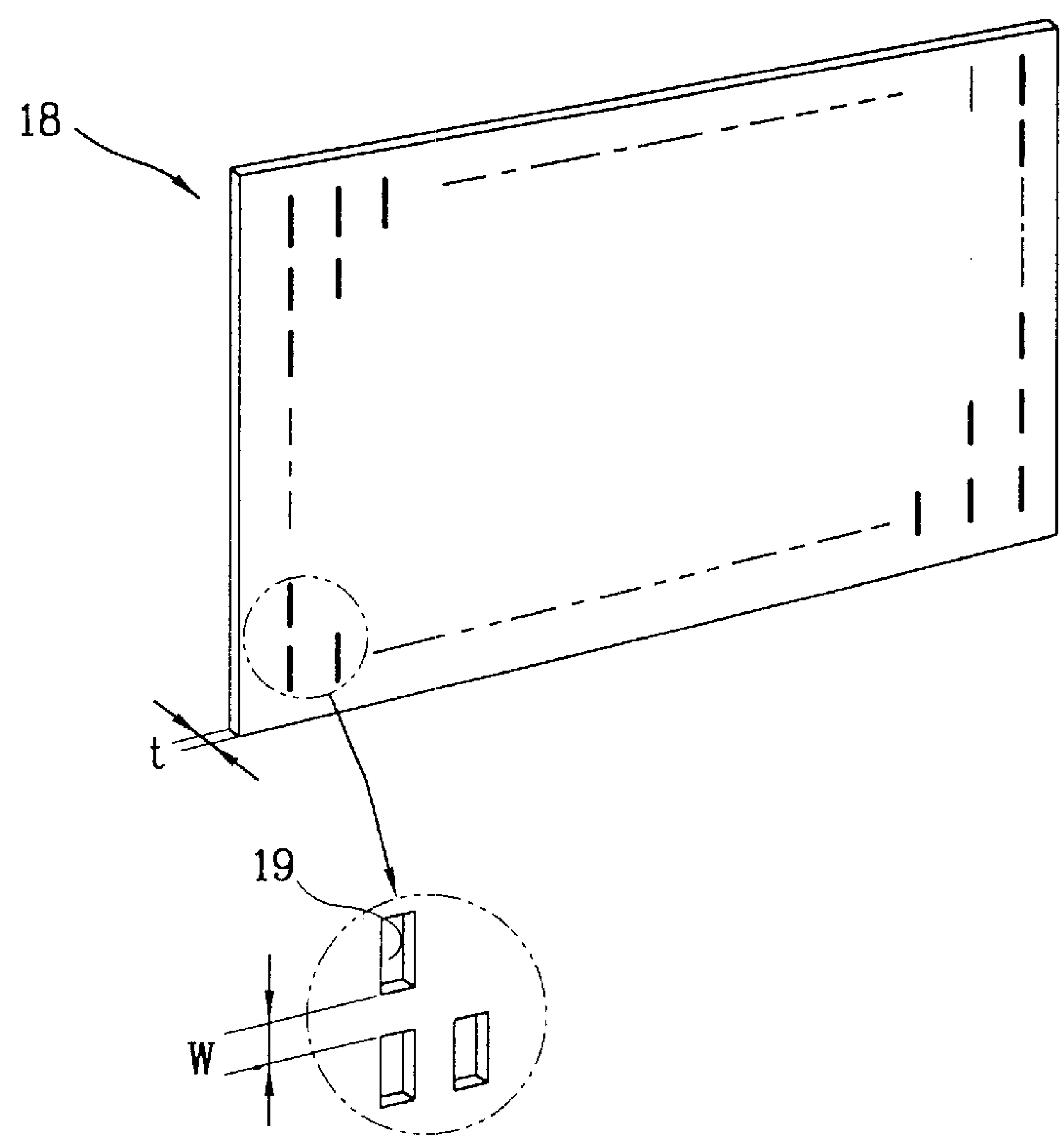


FIG. 3
BACKGROUND ART

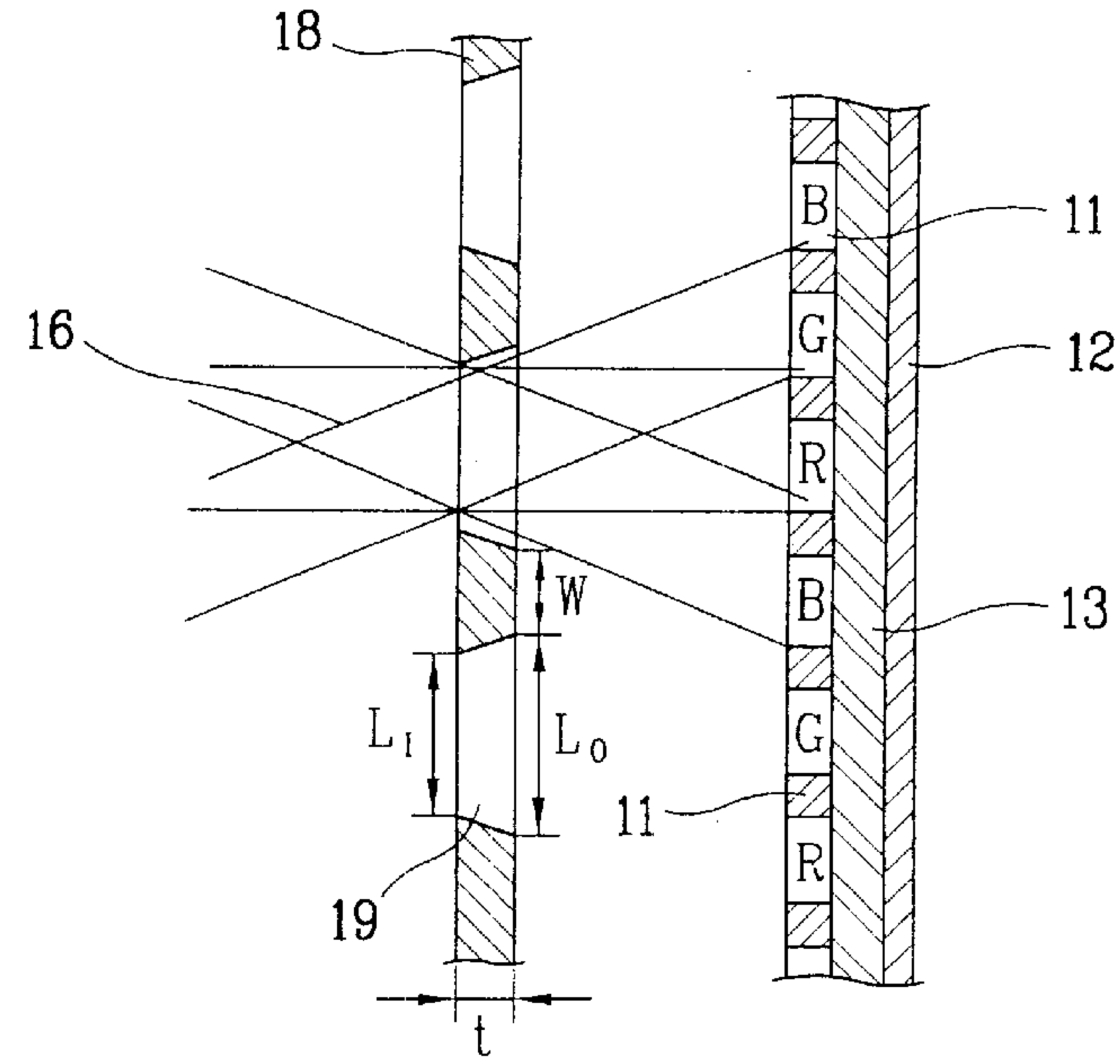


FIG. 4
BACKGROUND ART

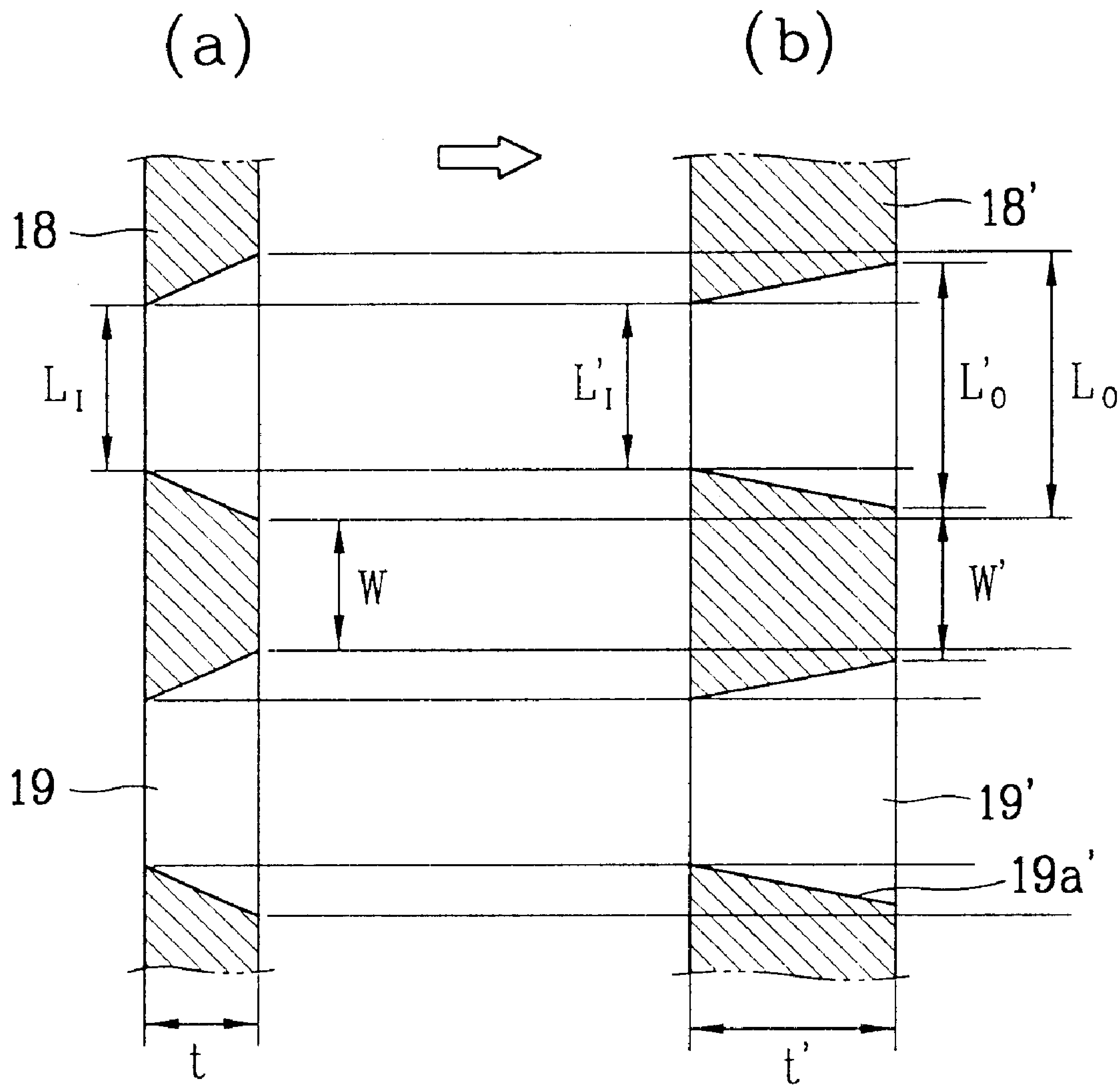


FIG. 5

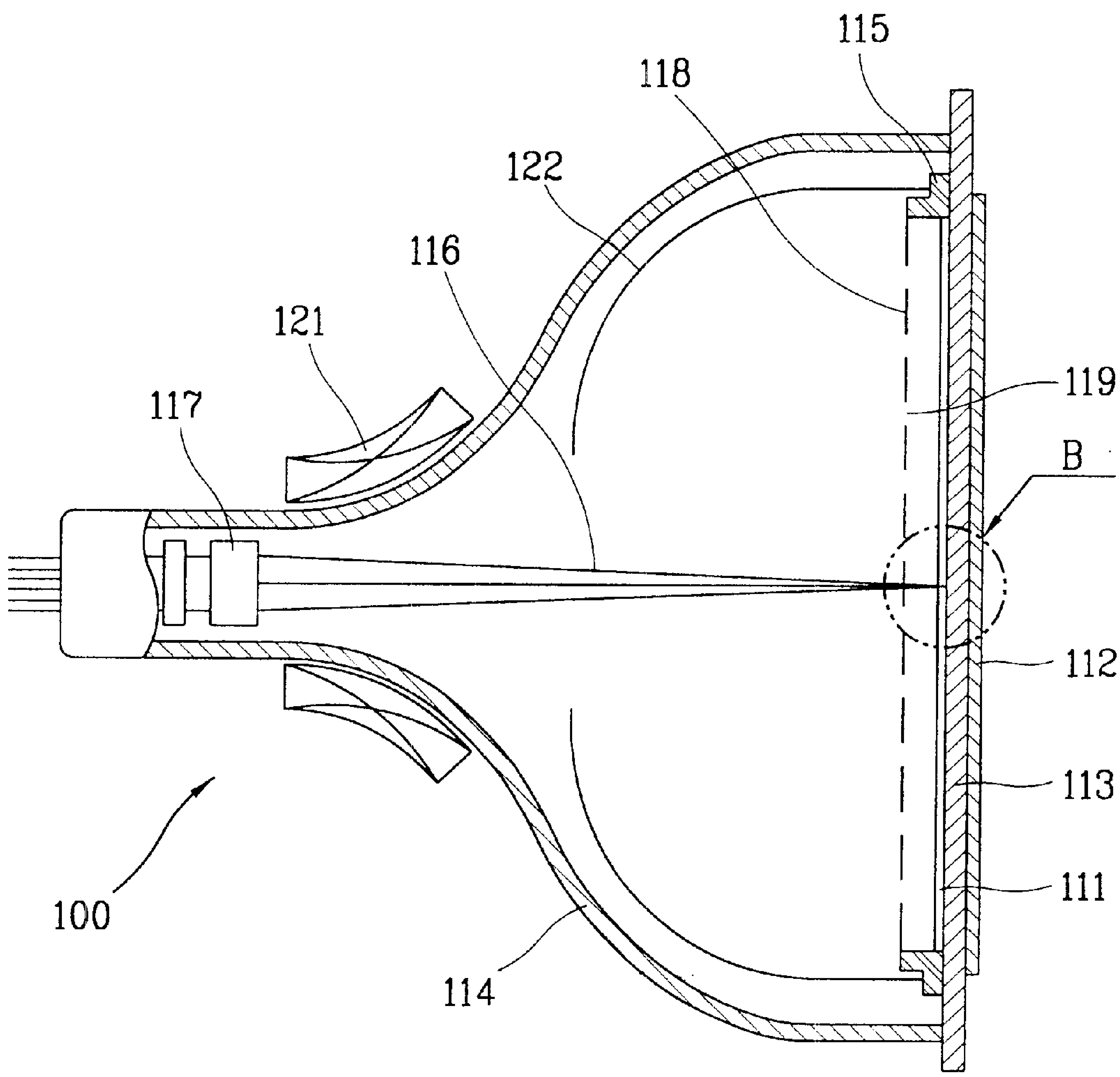


FIG. 6

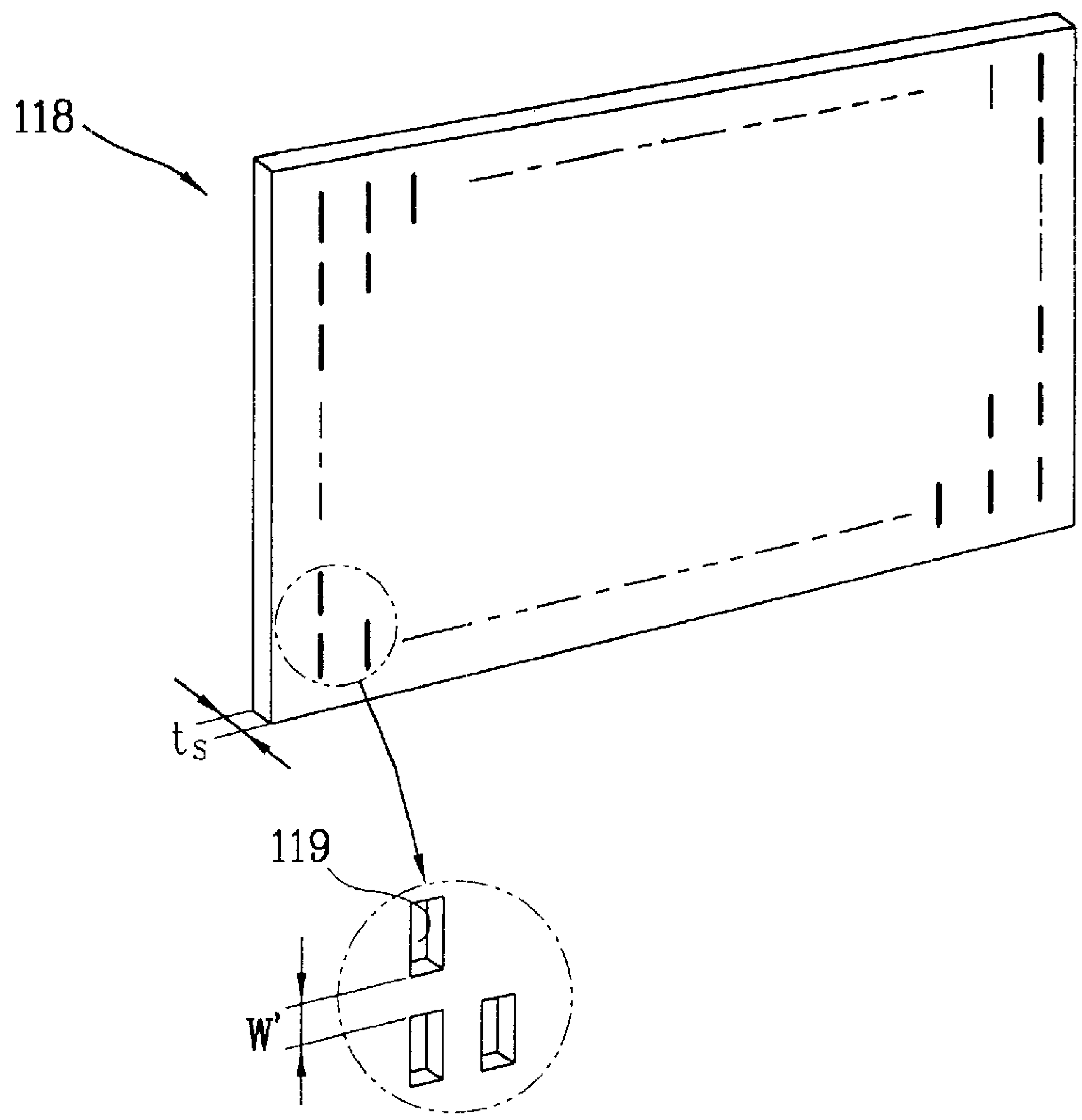
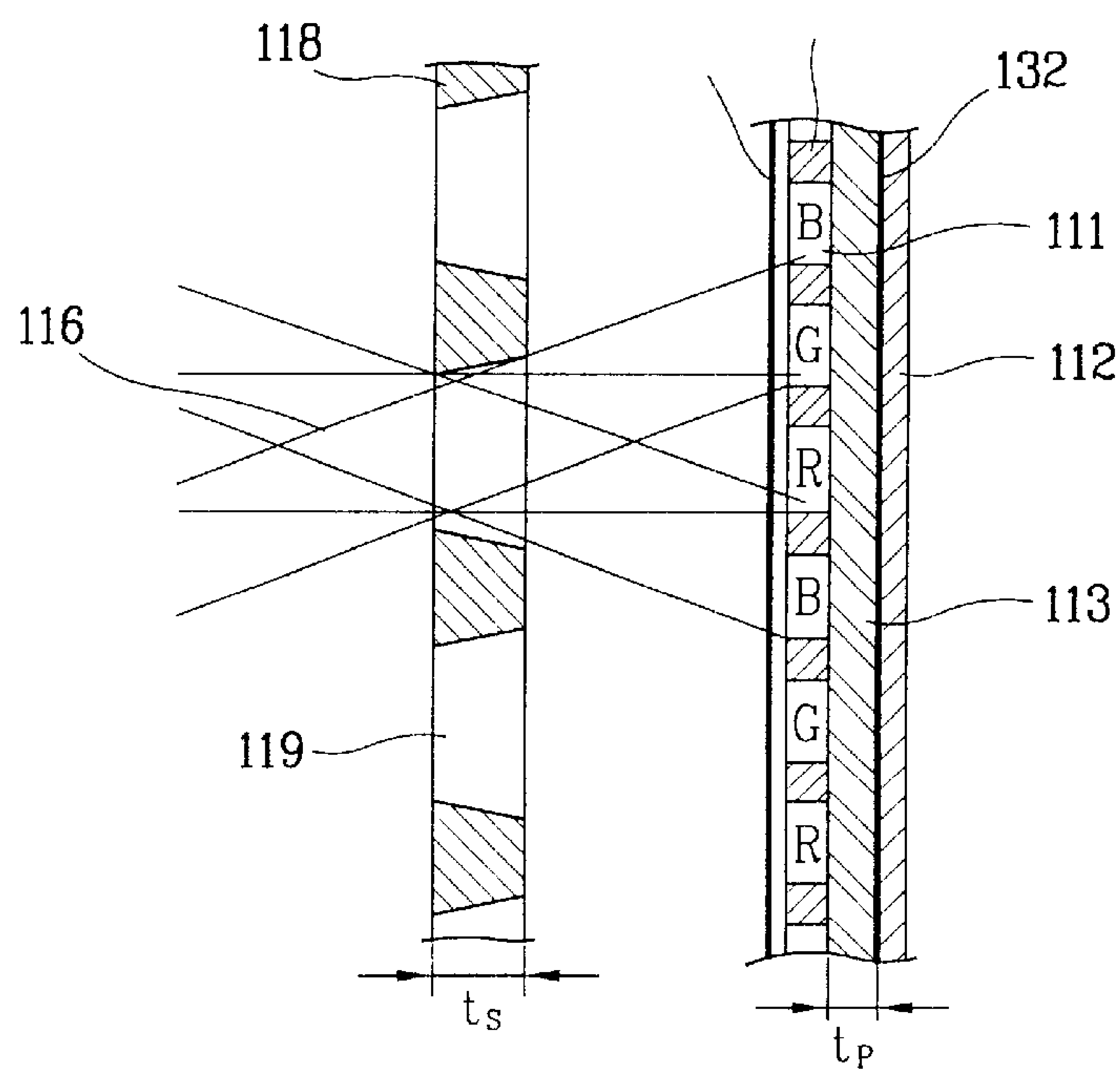


FIG. 7



FLAT TENSION MASK TYPE CATHODE RAY TUBE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention is relates to a flat CRT (Cathode Ray Tube), in particular to a flat tension mask type CRT which improves structures of a shadow mask and a panel.

2. Description of the Prior Art

In general, a cathode ray tube is for reproducing a received electric signal into a video signal, it is used for a video displaying apparatus such as a television, a monitor etc., and it is divided into a curved surface type and a flat type.

Between the above-mentioned CRT, the flat CRT which is superior than the curved CRT in the image distortion and outer light reflexibility aspects will now be described.

As depicted in FIG. **1**, a general flat CRT **1** comprises a panel **13**, a funnel **14**, and an electron gun **17**.

The panel **13** comprises a fluorescent screen **11** constructed with red, green, blue stripes or dots shape fluorescent material, and a safety glass **12** adhered to the front surface by a resin as a hardening adhesion for preventing damage of the panel **13** due to durability lowering caused by the flat surface of the panel **13**.

In addition, a shadow mask **18** is fixedly formed on a rail **15** adhered to the back of the fluorescent screen **11** of the panel **13** by welding.

And, the funnel **14** as a vacuum bulb is fixedly formed on the rear of the panel **13**, the electron gun **17** for scanning an electron beam **16** is placed in a neck unit **14***a* of the funnel **14**, and a deflection yoke **21** for deflecting the electron beam **16** is installed on the outer circumference of the neck unit **14***a*.

Particularly, as depicted in FIG. **2**, the shadow mask **18** is fabricated as a very thin film having a thickness of about 25 μm in order to improve a transmittance of the electron beam **16**, and a plurality of through holes **19** are formed with a certain interval.

The plurality of through holes **19** are formed by an etching process in fabrication of the shadow mask **18**, as depicted in FIG. **3**, an outlet size L_0 of the through hole **19** on the front surface is bigger than an inlet size L_1 of the through hole **19** on the inner surface.

Meanwhile, a vertical direction width between the through holes **19** on the shadow mask **18** is called as a bridge width W.

A video reproducing process of the above-described flat CRT will now be described.

As depicted in FIG. **1**, the received electric signal is controlled, accelerated, collimated by a voltage applied to each electrode, and its orbit is adjusted to a horizontal direction or a vertical direction by a magnetic field of the deflection yoke **21**.

After that, as depicted in FIG. **3**, the deflected electron beam **16** radiates the fluorescent material of the fluorescent screen **11** coated on the back of the panel **13** by passing through the through hole **19** of the shadow mask **18**, accordingly a picture is reproduced.

However, in the above-mentioned shadow mask **18** used for the conventional flat CRT, a rolling process is additionally required in order to fabricate the shadow mask **18** as a very thin film having a thickness of about 25 μm, deformation of the mask largely occurs in the etching process for forming the through hole **19**, an error such as a fracture etc. occurs in fabrication process of the flat CRT (Cathode Ray Tube), accordingly fabrication of the shadow mask is not easy, error rate in fabrication is high, handling is difficult, and the price is high.

In addition, in the conventional flat CRT, when the shadow mask **19** is fixed to the rail **15**, a rip etc. can occur due to a shear stress, because the heat quantity of the shadow mask **18** is small, a doming can occur due to collision of the electron beam and the electron beam can not land accurately on the fluorescent material, accordingly luminance and color vividness of the picture quality can lower.

Because of the above-mentioned problems, as depicted in FIG. **4**, when the thickness t of the shadow mask **18** increases from (a) to (b), a size L_1' of the through hole on the inner surface can be fabricated as same with the size L_1 which is the size when the shadow mask **18** has a thickness t of 25 μm in fabrication of a through hole **19'** of a shadow mask **18'** with the etching process.

However, in the shadow mask **18'**, because of a problem from the fabrication technology point of view, a size L_0' of the through hole **19'** on the front surface has to be a little smaller than the size L_0 when the shadow mask **18** has a thickness t of 25 μm.

Accordingly, in the shadow mask **18'** having the increased thickness t', the inner surface **19***a'* from the inlet to the outlet of the through hole **19'** is formed gently, and the bridge width W' between the through holes **19'** increases.

In order to improve the durability of the shadow mask **18**, when the thickness t increases, because the outlet size L_0' of the through hole **19'** decreases due to a difficult point of the fabrication process of the through hole **19'**, the transmittance of the electron beam decreases.

It can be described as below table 1.

TABLE 1

Shadow Mask Thickness (t)	Bridge Width (W)	Luminance of CRT (FL)
25 μm	0.027 mm	About 31.5 FL
50 μm	0.035 mm	About 30.4 FL
80 μm	0.038~0.040 mm	About 29.9 FL

As described in table 1, when the shadow mask **18'** has a thickness of not less than 50 μm, because the outlet size L_0' of the through hole **19'** decreases, the bridge width W' increases. Herein, the electron beam transmittance of the shadow mask **18'** decreases not less than 10%.

After all, when the thickness t increases in order to improve the durability of the shadow mask **18**, the electron beam transmittance decreases, the ratio of the electron beam **16** for radiating the red, green, blue fluorescent material of the fluorescent screen **11** decreases, accordingly the luminance as the brightness of the CRT lowers.

SUMMARY OF THE INVENTION

In order to solve above-mentioned problems, the object of the present invention is to provide a flat CRT (Cathode Ray Tube) which is capable of making fabrication and handling of a shadow mask easier by designing a panel so as to get an appropriate luminance while increasing a thickness of the shadow mask, and improving a picture quality by heightening the final luminance of the CRT.

In order to achieve the object of the present invention, the flat tension mask type CRT in accordance with the present invention comprises a flat panel fixed to the front of a funnel, and a shadow mask fixed inside of the funnel with a certain distance from the panel, herein the shadow mask has a thickness of 50 μm~80 μm, and the panel has a transmittance of 47%~50%.

The flat tension mask type CRT has a luminance of not less than 31 FL, and the panel has a thickness of 13 mm~14.5 mm.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a cross-sectional view illustrating a flat CRT in accordance with the prior art.

FIG. **2** is a schematic view illustrating a shadow mask of FIG. **1**.

FIG. **3** is a detailed view of an "A" part of FIG. **1**, it is a perspective schematic view illustrating a section of a shadow mask, an electron beam passing through the section, and a panel.

FIG. **4** is a perspective comparison view illustrating variation of a bridge width when a thickness of a shadow mask increases.

FIG. **5** is a cross-sectional view illustrating a flat CRT in accordance with the present invention.

FIG. **6** is a schematic view illustrating a shadow mask used in FIG. **5**.

FIG. **7** is a detailed view of a "B" region of FIG. **5**, it is a perspective schematic view illustrating a section of a shadow mask, an electron beam passing the section, and a panel in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Hereinafter, the preferred embodiment of a flat tension mask type CRT (Cathode Ray Tube) in accordance with the present invention will now be described with reference to accompanying drawings.

FIG. **5** is a cross-sectional view illustrating a flat CRT in accordance with the present invention.

FIG. **6** is a schematic view illustrating a shadow mask used in FIG. **5**.

FIG. **7** is a detailed view of a "B" region of FIG. **5**, it is a perspective schematic view illustrating a section of a shadow mask, an electron beam passing through the section, and a panel in accordance with the present invention.

With reference to FIG. **5**, the flat tension mask type CRT in accordance with the present invention comprises a funnel **114** as a vacuum bulb for making a vacuum state in order to prevent the electron beam from breaking away from a landing path toward the fluorescent material by an obstacle, a panel **113** for fixing the funnel **114** and reproducing an image, and an electron gun **117** for discharging an electron beam **116** by receiving an electric signal.

The panel **113** is formed as a flat, and it comprises a fluorescent material **111** coated with a plurality of stripes or dots shape fluorescent material.

And, a safety glass **112** having a transmittance of 92% and having not less than two layers such as a dust layer, a discharge layer etc. is adhered to the front surface of the panel **113** by a resin **132** as a hardening adhesion.

Herein, the safety glass **112** is for preventing the damage of the panel **113** caused by stiffness lowering in inverse proportion to curvature due to the flat fabrication of the panel **113**.

A rail **115** is adhered to each inner wall side of the panel **113** by a flit glass, and the end side of the shadow mask is fixed to the rail **115** by welding.

Accordingly, there is a certain distance between the shadow mask **118** and the fluorescent screen **111** of the panel **113**.

In the meantime, a rectangular inner shield **122** is fixed to the side of the rail **113** in order to prevent the electron beam **116** scanned by the electron gun **117** from landing on the other fluorescent material by breaking away from the fluorescent material to be landed due to the magnetic field of the deflection yoke **121** etc.

In FIG. **7**, a non-explanation reference numeral **131** is an aluminum layer, and a non-explanation reference numeral **133** is a screen.

In the flat tension mask type CRT in accordance with the present invention, the shadow mask **118** has a thickness t_s of 50 μm~80 μm which is thicker than the thickness t as 25 μm in the prior art as depicted in FIG. **2**.

And, between a tint glass and a clear glass used for the general material of a panel, the tint glass is used for the panel **113**, herein the panel **113** is formed so as to have a transmittance of 47%~50%.

And, the panel **113** has a thickness t_p of 13 mm~14.5 mm in order to have a transmittance of 47%~50%.

In addition, the panel **113** is set as an average roughness on the inner side where the fluorescent material is coated has a stipple depth not greater than 2.5 μm, it is advisable for the panel **113** to have depth of 0.7 μm~2.5 μm.

In the meantime, as depicted in FIG. **1**, the panel constructed with the tint glass in the prior art has a transmittance of about 42%, and has a thickness of 15.3 mm.

In the present invention, because the more transmittance of the panel **113** heightens, the more overall luminance of the CRT **100** heightens, accordingly the transmittance of the panel **113** heightens on the comparison with the prior art in order to prevent lowering of the luminance of the overall CRT **100** due to the increase of the thickness of the shadow mask **118**.

The transmittance of the panel **113** is influenced by the thickness variation, the transmittance Tg of the panel **113** is determined by equation 1.

$$Tg=(1-R)^2\times e^{-kt} \tag{1}$$

Herein, R is a surface reflexibility of the panel, k is an absorption coefficient, and t is the thickness of the panel.

When the panel **113** is constructed with the tint glass, the R value is 4.5%, and the k is 0.04626.

When the panel **113** has a thickness of 15.3 mm as the thickness in the prior art, it has a transmittance Tg of 45%, when the panel **113** has a thickness of 15.0 mm thinner than the thickness in the prior art, it has a transmittance Tg of 45.6%, when the panel **113** has a thickness of 14 mm, it has a transmittance Tg of 47.7%, and when the panel **113** has a thickness of 13 mm, it has a transmittance Tg of 50%.

Accordingly, in order to get the transmittance Tg between 47%~50%, the panel has to have a thickness t_p of 13 mm~14.5 mm, it is advisable for the panel **113** to have a thickness of 13.5 mm.

However, when the transmittance of the panel **113** heightens more, although the overall luminance of the CRT **100** improves, a contrast characteristic lowers, the clearness of the picture lowers, accordingly it is advisable to set the thickness t_p not less than 13.0 mm in order to get the transmittance not greater than 50%.

In addition, when the thickness t_p of the panel **113** lowers not greater than 13.0 mm, although the luminance increases by the transmittance heightening, it is difficult to maintain the durability of the CRT **100** by lowering of an explosion proof characteristic of the panel **113**, accordingly it is advisable to set the thickness t_p of the panel **113** not less than 13.0 mm.

As described above, when the transmittance improves by making the thickness t_p of the panel **113** thinner, the overall luminance FL of the CRT **100** can improve through equation 2.

$$FL=\frac{(Ts\cdot Tg\cdot Tm\cdot Tal\cdot Tscreen\cdot Tr\cdot Eb\cdot Ik\cdot C\cdot\eta\cdot\delta)}{(A\cdot\pi)} \quad (2)$$

As described above, Ts is the transmittance of the safety glass **112**, Tg is the transmittance of the panel **113**, Tm is the transmittance of the shadow mask **118**, Tal is the transmittance of the aluminum layer **131**, Tscreen is the transmittance of the screen **133**, Tr is the transmittance of the resin **132**, Eb is the transmittance of a rated voltage by models, Ik is a cathode current of the electron gun **117**, C is a FL transmutation constant, η is the efficiency of the fluorescent material, A is the width of the screen **133**, and δ is a temporary constant.

As described above, the final luminance FL of the CRT (Cathode Ray Tube) **100** calculated with equation 2 is determined by major variables such as the panel **113**, safety glass **112**, resin **132**, and transmittance of the shadow mask **131** etc.

Herein, in order to make the fabrication easier, in the flat tension mask type CRT in accordance with the present invention, the thickness of the shadow mask **118** is set not less than 50 μm, and the transmittance of the safety glass **112**, screen **133**, resin **132**, aluminum layer **131** etc. are set as below by considering production cost and productivity etc.

The safety glass **112** has a transmittance (Ts) of 92%, the aluminum layer **131** has a transmittance (Tal) of 100%, the screen **133** has a transmittance (Tscreen) of 62.8%, the resin **132** has a transmittance (Tr) of 98%, the rated voltage by models is 26 KV, the cathode current (IK) is 600 μA, the temporary constant (δ) is 0.83, the FL variable constant (c) is 0.2919, the efficiency of the fluorescent material (η) is 38, and the width of the screen (A) is $(0.315\times0.235)m^2$.

Herein, the resin **132** is the hardening adhesion for adhering the safety glass **122** to the panel **113**, it is acrylaid constructed with major constituents of 42% IBOA (ISobonylacrylate) and 28% FA_2D (Caprolactone) having a viscosity of 60~80CPS, a reflective index of 1.44~1.48, a specific gravity of 1.0~1.1 g/cm^3, and a permeability of 98~100%.

Hereinafter, the process for getting a certain luminance FL of the CRT (Cathode Ray Tube) **100** in accordance with the variation of the thickness t_s of the shadow mask **118** and variation of the transmittance Tg of the panel **113** will now be described.

First, the transmittance of the panel **113** is set as 47%, the thickness t_s of the shadow mask **118** is set as 50 μm, and the final luminance FL of the CRT **100** is calculated with equation 2.

Herein, because the shadow mask **118** has a bridge width W' of about 0.035~0.037 mm as depicted in table 1 in the prior art, the transmittance Tm is between 19.1~19.5%, when the final luminance FL is calculated with equation 2 by setting the transmittance Tm of the shadow mask **118** as 19.30%, the final luminance is 31.7 FL which is almost same with the final luminance in the 25 μm thickness of the shadow mask.

Next, when the transmittance Tg of the panel **113** is set as 48%, the thickness t_s of the shadow mask **118** is set as 50 μm, and rest variables are same, the final luminance FL of the CRT (Cathode Ray Tube) **100** is calculated with equation 2.

In other words, when Ts (the transmittance of the safety glass)=92%, Tg (the transmittance of the panel)=48%, Tm (the transmittance of the shadow mask)=19.30%, Tal (the transmittance of the aluminum layer)=100%, Tscreen (the transmittance of the screen)=62.8%, Tr (the transmittance of the resin)=98%, Eb (the rated voltage by models)=26 KV, IK (the cathode current)=600 μA, δ (the temporary constant)=0.83, C (the FL variable constant)=0.2919, 72 (the efficiency of the fluorescent material)=38, A (the width of the screen)= 0.315×0.235 m^2, the final luminance of the CRT (Cathode Ray Tube) **100** calculated with equation 2 is 32.4 FL.

Next, the transmittance of the panel **113** is set as 49%, the thickness of the shadow mask is set as 50 μm, and the rest variables are same, the final luminance FL of the CRT **100** is calculated with equation 2.

In other words, when Ts (the transmittance of the safety glass)=92%, Tg (the transmittance of the panel)=49%, Tm (the transmittance of the shadow mask)=19.30%, Tal (the transmittance of the aluminum layer)=100%, Tscreen (the transmittance of the screen)=65.8%, Tr (the transmittance of the resin)=98%, Eb (the rated voltage by models)=26 KV, IK (the cathode current)=600 μA, δ (the temporary constant)=0.83, C (the FL variable constant)=0.2919, η(the efficiency of the fluorescent material)=38, A (the width of the screen)= $0.315\times0.235m^2$, accordingly the final luminance of the CRT **100** calculated with equation 2 is 33.1 FL.

Next, when the transmittance Tg of the panel **113** is set as 50%, the thickness t_s of the shadow mask is set as 50 μm, and the rest variables are same, the final luminance FL of the CRT **100** (Cathode Ray Tube) can be calculated with equation 2.

In other words, when Ts (the transmittance of the safety glass)=92%, Tg (the transmittance of the panel)=50%, Tm (the transmittance of the shadow mask)=19.30%, Tal (the transmittance of the aluminum layer)=100, Tscreen (the transmittance of the screen)=62.8% Tr (the transmittance of the resin)=98% Eb (the rated voltage by models)=26 KV, IK (the cathode current)=600 μA, δ (the temporary constant)=0.83, C (the FL variable constant)=0.2919, η (the efficiency of the fluorescent material)=38, A (the width of the screen)= 0.315×0.235 m^2, accordingly the final luminance of the CRT **100** calculated with equation 2 is 33.7 FL.

As described above, the final luminance FL among 31.7 FL~33.7 FL can be gotten by improving the transmittance Tg as 47%~50%, by increasing the thickness t_s of the shadow mask **118** as 50 μm and decreasing the thickness of t_p of the panel **113** as 13 mm~14.5 mm.

In other words, when Ts (the transmittance of the safety glass)=9%, Tg (the transmittance of the panel)=50, Tm (the transmittance of the shadow mask)=19.30, Tal (the transmittance of the aluminum layer)=100, Tscreen (the transmittance of the screen)=6%.8, Tr (the transmittance of the resin)=98, Eb (the rated voltage by models)=%6 KV, IK (the cathode current)=600 μA, δ (the temporary constant)=0.83, C (the FL variable constant)=0.%919, η (the efficiency of the fluorescent material)=38, A (the width of the screen)=0.315× 0.%35 m^2, accordingly the final luminance of the CRT **100** calculated with equation % is 33.7 FL.

As described above, the final luminance FL among 31.7 FL~33.7 FL can be gotten by improving the transmittance Tg as 47~50 by increasing the thickness t_s of the shadow mask **118** as 50 μm and decreasing the thickness t_p of the panel **113** as 13 mm~14.5 mm.

The results discussed above are summarized in Table 2 below.

TABLE 2

Shadow Mask Thickness (t)	Transmittance of panel (Tg)	Luminance of CRT (FL)
50 μm	47%	31.7
50 μm	48%	32.4 FL
50 μm	49%	33.1
50 μm	50%	33.7

The same phenomena was present for shadow mask thickness greater than 50 μm and up to 80 μm.

Accordingly, when the thickness t_s of the shadow mask **118** increases as 50 μm~80 μm, the flat tension mask type CRT in accordance with the present invention is capable of guaranteeing an appropriate luminance of the CRT (Cathode Ray Tube) **100** by comprising the panel **113** having 47%~50% transmittance, making the fabrication and handing of the shadow mask **118** easier, and improving the durability, accordingly the fabrication of the flat CRT **100** is easier.

In addition, in the flat tension mask type CRT in accordance with the present invention, because the volume increases on the comparison with the prior art according to increase of the thickness t_s of the shadow mask **118**, the heat capacity increases, accordingly the volume variation due to the temperature rise occurred by the collision of the electron beam in operation of the CRT (Cathode Ray Tube) **100** can decrease.

And, because the position variation of the shadow mask **118** due to the doming is not big by reducing the volume variation of the shadow mask **118**, the color vividness and luminance of the picture quality of the CRT (Cathode Ray Tube) **100** improve by reducing the variation quantity of the electron beam.

Accordingly, the flat tension mask type CRT in accordance with the present invention is capable of heightening the productivity and durability by increasing the thickness t_s of the shadow mask **118**, and improving the overall luminance and color vividness of the CRT **100**.

As the present invention may be embodied in several forms without departing from the spirit or essential characteristics thereof, it should also be understood that the above-described embodiments are not limited by any of the details of the foregoing description, unless otherwise specified, but rather should be constructed broadly within its sprit and scope as defined in the appended claims, and therefore all changes and modifications that fall within the meets and bounds of the claims, or equivalence of such meets and bounds are therefore intended to be embraced by the appended claims.

What is claimed is:

1. A flat tension mask type CRT (Cathode Ray Tube), comprising:

a flat panel fixed on a front of a funnel of the CRT; and

a shadow mask fixed inside of the funnel at a predetermined distance from the panel, wherein the shadow mask has a thickness of 50 μm~80 μm, and the panel has a transmittance of 47%~50%.

2. The flat tension mask type CRT according to claim **1**, wherein the flat CRT has a luminance of not less than 31FL.

3. The flat tension mask type CRT according to claim **2**, wherein the flat CRT has a luminance of 31.7FL~33.7FL.

4. The flat tension mask type CRT according to claim **1**, wherein the shadow mask has a bridge width of 0.035 mm~0.037 mm as a width in the vertical direction between through holes where electron beams pass.

5. The flat tension mask type CRT according to claim **4**, wherein the shadow mask has a transmittance of 19.1%~19.5%.

6. The flat tension mask type CRT according to claim **1**, wherein the panel has a thickness of 13 mm~14.5 mm.

7. The flat tension mask type CRT according to claim **6**, wherein the panel has a thickness of 13.5 mm.

8. The flat tension mask type CRT according to claim **6**, wherein the panel has a stipple depth not greater than 2.5 μm as an average roughness in a side where a fluorescent screen is formed.

9. The flat tension mask type CRT according to claim **8**, wherein the panel has an average roughness of 0.7 μm~2.5 μm stipple depth.

10. The flat tension mask type CRT according to claim **1**, wherein the panel is constructed with a tint glass.

11. A flat tension mask type CRT (Cathode Ray Tube), comprising:

a flat panel fixed on a front of a funnel of the CRT; and

a shadow mask fixed inside of the funnel at a predetermined distance from the panel, wherein the shadow mask has a thickness of 50 μm~80 μm, and the panel has a transmittance of 47%~50%, and wherein a safety glass is adhered to the front surface of the panel by a resin, and the safety glass has a transmittance of 92%.

12. The flat tension mask type CRT according to claim **11**, wherein a fluorescent screen is formed on an inner surface of the panel, wherein an aluminum layer is positioned a predetermined distance from the screen, and wherein the resin has a transmittance of 98%, the screen has a transmittance of 62.8%, the aluminum layer has a transmittance of 100%, the fluorescent material has an efficiency of 38, and the screen has a width of $(0.315 \times 0.235)m^2$.

13. The flat tension mask type CRT according to claim **12**, wherein the resin is constructed with acrylaid having 42% IBOA (lSobonylacrylate) and 28% FA_2D (Caprolactone) as major constituents in order to have a viscosity of 60~80CPS, a reflective index of 1.44~1.48, a specific gravity of 1.0~1.1 g/cm^3, and a permeability of 98~100%.

14. A flat tension mask type CRT, comprising:

a funnel;

an electron gun positioned in a neck of the funnel;

a deflection yoke positioned around an outer circumference of the neck of the funnel;

a flourescent material provided on an inner surface of a panel; and

a shadow mask positioned inside the funnel a predetermined distance from the panel, wherein the shadow mask has a thickness of 50 μm~80 μm, and the panel has a transmittance of 47%~50%.

15. A flat tension mask type CRT (Cathode Ray Tube) consisting of:

a flat panel fixed on a front of a funnel of the CRT; and

a shadow mask fixed inside of the funnel at a predetermined distance from the panel, wherein the shadow mask has a thickness of 50 μm~80 μm, and the panel has a transmittance of 47%~50%.

* * * * *